

WHAT IS CLAIMED IS:

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1. An image forming apparatus that forms a multi-color image by superposing a plurality of monochrome images, comprising:

- a plurality of image forming units
- 10 corresponding to respective colors, each of which forms said corresponding monochrome image;
- a plurality of pattern forming units
- corresponding to the respective colors, each of which forms a predetermined compensation pattern;
- 15 a plurality of pattern position detecting units corresponding to the respective colors, each of which detects the position of said compensation pattern formed by said pattern forming unit of the corresponding color; and
- 20 a plurality of image position adjusting units corresponding to the respective colors, each of which adjusts the position of said monochrome image to be formed by said image forming unit based on the position of said compensation pattern detected by
- 25 said pattern position detecting unit of the

corresponding color;

wherein said compensation pattern is formed
under an image forming condition adjustable
independently from an image forming condition with
5 which said monochrome image formed by said image
forming unit of the corresponding color is formed.

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2. The image forming apparatus as claimed in
claim 1, wherein

each of said plurality of image forming
units further comprises:

15 one of a rotating and a moving image
retaining unit on which a latent monochrome image is
formed by scanning said image retaining unit with a
light beam based on image data;

a development unit that makes said formed
20 latent monochrome image visible; and

one of a rotating and a moving transfer unit
that transfers said visible monochrome image to a
recording medium.

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3. The image forming apparatus as claimed in claim 2, wherein said image forming condition is adjusted by changing exposure energy of said light beam.

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4. The image forming apparatus as claimed in claim 3, wherein said exposure energy of said light beam is adjusted by changing light intensity of said light beam.

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5. The image forming apparatus as claimed in claim 3, wherein said exposure energy of said light beam is adjusted by changing time in which said light beam is radiated.

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6. The image forming apparatus as claimed in

claim 2, wherein said image forming condition is
adjusted by changing bias voltage applied to said
development unit.

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7. The image forming apparatus as claimed in
claim 2, wherein said image forming condition is
10 adjusted by changing bias voltage applied to said
transfer unit.

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8. The image forming apparatus as claimed in
claim 2, wherein

said development unit makes said formed
latent monochrome image visible with toner; and

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said image forming condition is adjusted by
changing amount of toner to be used to make said
formed latent monochrome image visible.

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9. The image forming apparatus as claimed in claim 8, wherein if the amount of remaining toner is lower than a predetermined level, said amount of toner to be used to make said formed latent
5 monochrome image visible is changed.

10 10. The image forming apparatus as claimed in claim 8, wherein if said amount of toner is changed, said toner is stirred before forming said latent monochrome image.

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11. The image forming apparatus as claimed in claim 2, wherein said image forming condition is
20 adjusted by changing scan speed at which said light beam scans said image retaining unit.

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12. The image forming apparatus as claimed
in claim 2, wherein said image forming condition is
adjusted by changing one of moving speed and rotative
speed of said image retaining unit.

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13. The image forming apparatus as claimed
10 in claim 2, wherein said image forming condition is
adjusted by changing at least two of exposure energy
by said light beam, bias voltage of said development
unit, bias voltage of said transfer unit, toner
amount to be used for making said formed latent
15 monochrome image visible, scan speed at which said
light beam scans said image retaining unit, and one
of moving speed and rotative speed of said image
retaining unit.

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14. The image forming apparatus as claimed
in claim 2, wherein

25 said image retaining unit coupled with at

least one of a charging unit that charges said image retaining unit, said development unit, and a cleaning unit that cleans said image retaining unit forms a detachable process cartridge.

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15. The image forming apparatus as claimed
10 in claim 14, wherein

said process cartridge further comprises a memory unit that stores said image forming condition under which said compensation pattern is formed; and

said process cartridge, when forming said
15 compensation pattern, reads said image forming condition stored in said memory unit and forms said compensation pattern under the read image forming condition.

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16. The image forming apparatus as claimed
in claim 15, wherein said image forming condition
25 stored in said memory unit is rewritable.

17. The image forming apparatus as claimed
in claim 16, wherein

said image forming condition with which said
monochrome image is formed is stored in said memory

5 unit; and

when said monochrome image is formed, said
image forming condition with which said monochrome
image is formed is read from said memory unit, and
said monochrome image is formed under the read image
10 forming condition.

15 18. The image forming apparatus as claimed
in claim 17, wherein said image forming condition
with which said monochrome image is formed stored in
said memory unit is rewritable.

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19. The image forming apparatus as claimed
in claim 14, wherein

25 said process cartridge has a room in which

reserved toner is stored; and

if image density of said compensation
pattern is equal to or less than a predetermined
density, said reserved toner stored in said room is
5 provided to said development unit.

10 20. The image forming apparatus as claimed
in claim 19, wherein

said process cartridge provides said
reserved toner to a portion of said developing unit
that forms said compensation pattern.

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21. The image forming apparatus as claimed
20 in claim 19, wherein

amount of reserved toner provided to said
portion of said developing unit is stored in said
memory unit.

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22. The image forming apparatus as claimed
in claim 19, wherein said process cartridge, before
forming said compensation pattern, stirs said
reserved toner to be provided to said development
5 unit.

10 23. The image forming apparatus as claimed
in claim 2, wherein

said image retaining unit coupled with at
least one of a charging unit that charges said image
retaining unit and a cleaning unit that cleans said
15 image retaining unit forms a detachable
photosensitive body unit; and

said development unit forms a detachable
developing unit.

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24. The image forming apparatus as claimed
in claim 23, wherein

25 at least one of said photosensitive body

unit and said development unit has a memory unit to store an image forming condition to be used when said compensation pattern is formed; and

when said compensation pattern is formed,
5 said image forming condition stored in said memory unit is read, and said compensation pattern is formed using said read image forming condition.

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25. The image forming apparatus as claimed in claim 24, wherein said image forming condition stored in said memory unit is rewritable.

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26. The image forming apparatus as claimed
20 in claim 24, wherein

said image forming condition of said monochrome image is stored in said memory unit; and

when said monochrome image is formed, said image forming condition of said monochrome image is
25 read from said memory unit, and said monochrome image

is formed using said image forming condition of said monochrome image.

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27. The image forming apparatus as claimed in claim 26, wherein said image forming condition of a monochrome image stored in said memory unit is
10 rewritable.

15 28. The image forming apparatus as claimed in claim 23, wherein

said development unit is provided with a space for storing reserved toner; and

when image density of said formed
20 compensation pattern is lower than a predetermined density, said reserved toner stored in said space can be supplied to said development unit.

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29. The image forming apparatus as claimed
in claim 28, wherein said reserved toner is supplied
to a portion of said development unit that forms said
compensation pattern.

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30. The image forming apparatus as claimed
10 in claim 28, wherein said development unit is
provided with a memory for storing the supplied
amount of said reserved toner.

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31. The image forming apparatus as claimed
in claim 28, wherein said development unit stirs said
reserved toner provided thereto before forming said
20 compensation pattern.

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32. The image forming apparatus as claimed

in claim 2, further comprising a cleaning unit that cleans a position of said image retaining unit at which said compensation pattern is formed.

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33. The image forming apparatus as claimed in claim 2, wherein said compensation pattern of each color is formed under said image forming condition for forming said monochrome image.

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34. A process cartridge that is used for an image forming apparatus of claim 2, comprising:

said image retaining unit;

at least one of a charging unit that charges said image retaining unit, said development unit, and a cleaning unit that cleans said image retaining unit;

a memory unit that stores said image forming condition to be used when said compensation pattern is formed;

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wherein said image retaining unit and at least one of said charging unit, said development unit, and said cleaning unit are combined and detachable from said image forming apparatus.

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35. The process cartridge as claimed in claim 34, wherein said image forming condition of said compensation pattern stored in said memory unit is rewritable.

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36. The process cartridge as claimed in claim 34, wherein said memory unit stores said image forming condition to be used when said monochrome image is formed.

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37. The process cartridge as claimed in

claim 36, wherein said image forming condition of
said monochrome image stored in said memory unit is
rewritable.

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38. The process cartridge as claimed in
claim 34, further comprising a space in which
10 reserved toner is stored;

wherein, when image density of said formed
compensation pattern is lower than a predetermined
density, said reserved toner stored in said space can
be provided to said development unit.

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39. The process cartridge as claimed in
20 claim 38, wherein said reserved toner is provided to
a portion of said development unit that forms said
compensation pattern.

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40. The process cartridge as claimed in claim 38, further comprising a memory unit that stores the supplied amount of said reserved toner.

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41. The process cartridge as claimed in claim 38, wherein said reserved toner supplied to said development unit is stirred before forming said compensation pattern.

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42. A photosensitive body unit used for the image forming apparatus of claim 2, wherein

said photosensitive body unit is structured by said image retaining unit combined with at least one of a charging unit that charges said image retaining unit and a cleaning unit that cleans said image retaining unit; and

said photosensitive body unit is provided with a memory unit that stores said image forming condition used when said compensation pattern is

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formed.

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43. The photosensitive body unit as claimed in claim 42, wherein said image forming condition of said compensation pattern stored in said memory unit is rewritable.

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44. The photosensitive body unit as claimed in claim 42, wherein said memory unit stores said image forming condition used when said monochrome image is formed.

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45. The photosensitive body unit as claimed in claim 44, wherein said image forming condition of said monochrome image stored in said memory unit is rewritable.

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46. The photosensitive body unit as claimed in claim 42, further comprising a cleaning unit that cleans a position on said image retaining unit at which said compensation pattern is formed.

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47. A detachable development unit that is used for the image forming apparatus as claimed in claim 2, comprising a memory unit that stores said image forming condition to be used when said compensation pattern is formed.

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48. The development unit as claimed in claim 47, wherein said image forming condition of said compensation pattern stored in said memory unit is rewritable.

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49. The development unit as claimed in claim 48, wherein said memory unit stores said image forming condition to be used when said monochrome image is formed.

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50. The development unit as claimed in claim 49, wherein said image forming condition of said monochrome image stored in said memory unit is rewritable.

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51. The development unit as claimed in claim 47, further comprising a space in which reserved toner is stored;

20 wherein, if image density of said formed compensation pattern is less than a predetermined density, said reserved toner can be supplied to said development unit.

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52. The development unit as claimed in claim 51, wherein said reserved toner is supplied to a portion of said development unit that forms said compensation pattern.

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53. The development unit as claimed in claim 51, further comprising a memory unit that stores the supplied amount of said reserved toner.

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54. The development unit as claimed in claim 51, wherein said reserved toner provided to said development unit is stirred before forming said compensation pattern.

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55. An image forming apparatus that forms a multi-color image by superposing at least two

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monochrome images, comprising:

means for forming a plurality of monochrome images one provided for each color;

means for forming a plurality of
5 predetermined compensation patterns one provided for each color;

means for detecting positions of said formed compensation patterns provided for each color; and

means for adjusting positions of said
10 monochrome images to be formed based on the positions of said detected compensation patterns provided for each color;

wherein said compensation pattern is formed under an image forming condition adjustable
15 independently from another image forming condition under which said monochrome images are formed.

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56. The image forming apparatus as claimed in claim 55, wherein

said means for forming monochrome images further comprises:

25 means for retaining a latent monochrome

image formed by scanning said means for retaining a latent monochrome image with a light beam based on image data; said means for retaining a latent monochrome image rotating or moving;

5 means for developing said latent monochrome image formed on said means for retaining a latent monochrome image; and

 means for transferring said developed monochrome image to a recording medium that is
10 rotating or moving.

15 57. The image forming apparatus as claimed in claim 56, wherein said image forming condition is adjusted by changing exposure energy of said light beam.

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 58. The image forming apparatus as claimed in claim 57, wherein said exposure energy of said
25 light beam is adjusted by changing light intensity of

said light beam.

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59. The image forming apparatus as claimed in claim 57, wherein said exposure energy of said light beam is adjusted by changing time in which said light beam is radiated.

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60. The image forming apparatus as claimed in claim 56, wherein said image forming condition is adjusted by changing bias voltage applied to said means for developing said latent monochrome image.

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61. The image forming apparatus as claimed in claim 56, wherein said image forming condition is adjusted by changing bias voltage applied to said means for transferring said developed monochrome

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image.

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62. The image forming apparatus as claimed
in claim 56, wherein

said means for developing said latent
monochrome image make said formed latent monochrome
10 image visible with toner; and

said image forming condition is adjusted by
changing the amount of toner to be used to make said
formed latent monochrome image visible.

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63. The image forming apparatus as claimed
in claim 62, wherein if the amount of remaining toner
20 is lower than a predetermined level, said amount of
toner to be used to make said formed latent
monochrome image visible is changed.

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64. The image forming apparatus as claimed
in claim 56, wherein said image forming condition is
adjusted by changing scan speed at which said light
beam scans said means for retaining said latent
5 monochrome image.

10 65. The image forming apparatus as claimed
in claim 56, wherein said image forming condition is
adjusted by changing at least two of exposure energy
of said light beam, bias voltage of said means for
developing said latent monochrome image, bias voltage
15 of said means for transferring said developed
monochrome image, toner amount to be used for making
said formed latent monochrome image visible, scan
speed at which said light beam scans said means for
retaining said latent monochrome image, and one of
20 moving speed and rotative speed of said image
retaining unit.

66. A method of compensating for image deviation, using an image forming apparatus that forms a color image by superposing a plurality of monochrome images, comprising the steps of:

5 setting an image forming condition with which a prescribed compensation pattern for compensating for said image deviation of each monochrome image is formed;

 forming said prescribed compensation pattern
10 of each monochrome image using said set image forming condition;

 detecting the position of said formed compensation pattern;

 adjusting the position at which each
15 monochrome image is formed based on said determined pattern position.

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67. The method as claimed in claim 66, further comprising the step of determining whether said formed compensation pattern is detectible;

 wherein the step of setting said image
25 forming condition, the step of forming said

prescribed compensation pattern of each monochrome
image, and the step of detecting said pattern
position are repeated until said formed compensation
pattern is determined to be detectible before said
5 image position is adjusted.

10 68. The method as claimed in claim 67,
wherein said image forming condition is set by
adjusting exposure energy of a light beam.

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69. The method as claimed in claim 68,
wherein said exposure energy of said light beam is
adjusted by changing light intensity of said light
20 beam.

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70. The method as claimed in claim 68,

wherein said exposure energy of said light beam is
adjusted by changing time in which said light beam is
radiated.

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71. The method as claimed in claim 66,
wherein said image forming condition is set by
10 changing bias voltage applied to a development unit.

15 72. The method as claimed in claim 66,
wherein said image forming condition is set by
changing bias voltage applied to a transfer unit.

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73. The method as claimed in claim 66,
wherein said compensation pattern is made visible
from a latent pattern with toner; and
25 said image forming condition is set by

changing the amount of toner to be used to make said latent pattern visible.

74. The method as claimed in claim 66,
wherein, if the amount of remaining toner is lower
5 than a predetermined level, the amount of said toner
to be used to make said latent pattern visible is
changed.

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75. The method as claimed in claim 66,
wherein, if the amount of said toner is changed, said
toner is stirred before forming said latent pattern.

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76. The method as claimed in claim 66,
20 wherein said image forming condition is adjusted by
changing scan speed at which a light beam scans an
image to be retained.

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77. The method as claimed in claim 66,
wherein said image forming condition is adjusted by
changing moving speed or rotative speed of an image
retaining unit.

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78. The method as claimed in claim 66,
10 wherein said image forming condition is adjusted by
changing at least two of exposure energy by a light
beam, bias voltage of a development unit, bias
voltage of a transfer unit, the amount of toner to be
used for making a formed latent pattern visible, and
15 scan speed at which a light beam scans an image
retaining unit.

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79. The method as claimed in claim 66,
further comprising the step of reading said image
forming condition with which said prescribed
compensation pattern is formed, stored in a memory
25 unit;

wherein said prescribed compensation pattern
is formed using said read image forming condition.

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80. The method as claimed in claim 66,
wherein said image forming condition with which said
compensation pattern is formed is different from
10 another image forming condition with which said
plurality of monochrome images are formed.